THIN FILM SURFACE MOUNT

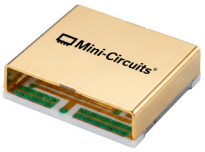
Band Pass Filter

ABF-4R5G+

50Ω 3700 to 5300 MHz

THE BIG DEAL

- Low Passband Insertion Loss of 2 dB Typ.
- High Rejection of 65 dB Typ.
- Good Return Loss of 10 dB Typ.



Generic photo used for illustration purposes only

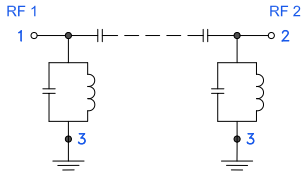
APPLICATIONS

- C-Band Filter

PRODUCT OVERVIEW

Mini-Circuits' Surface Mount Thin-Film filters offer low insertion loss and high rejection realized via Thin-Film on Alumina substrate, using a sputtering process that can guarantee an enhanced Q and repeatable performance. Low pass, high pass, and bandpass surface mount thin-film designs can be realized with this technology up to 40 GHz in a small form factor helping customers achieve their SWaP objectives. Using our high quality thin-film manufacturing process we can guarantee repeatability on large batches of filters

FUNCTIONAL DIAGRAM



ELECTRICAL SPECIFICATIONS[1,2,3] AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency[4]	—	—	—	4500	—	MHz
	Insertion Loss	F1-F2	3700 - 5300	—	2	2.7	dB
	Return Loss	F1-F2	3700 - 5300	—	10	—	dB
Stopband, Lower	Rejection	DC-F3	DC - 1500	55	65	—	dB
		F3-F4	1500 - 2500	35	40	—	
		F4-F5	2500 - 2900	20	25	—	
Stopband, Upper	Rejection	F6-F7	6200 - 6600	20	30	—	dB
		F7-F8	6600 - 9000	35	45	—	

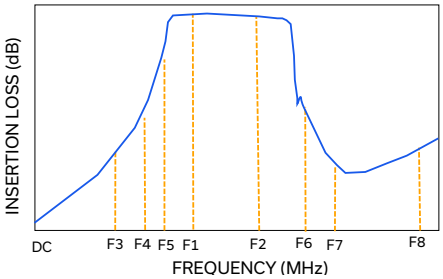
1. Tested in Evaluation Board P/N TB-ABF-4R5G+ with feedline losses removed by normalization of S12 and S21 traces to measurement of TB thru-line.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.
3. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.
4. Typical variation ± 3%

ABSOLUTE MAXIMUM RATINGS[5]

Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
Input Power[6]	9.5 W

5. Permanent damage may occur if any of these limits are exceeded.
6. Power rating applies only to signals within the passband.

TYPICAL FREQUENCY RESPONSE



REV. OR
ECO-031167
ABF-4R5G+
EDU5513
MCINU
250918

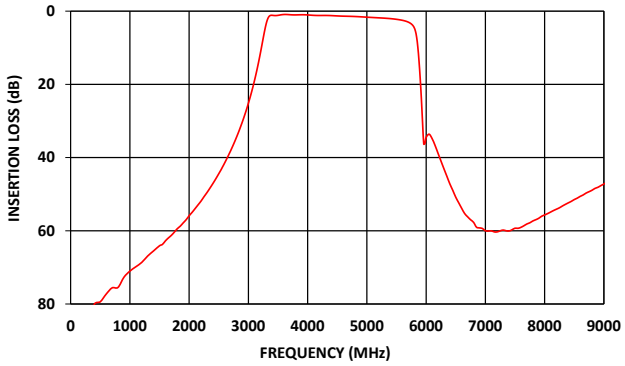
Band Pass Filter

ABF-4R5G+

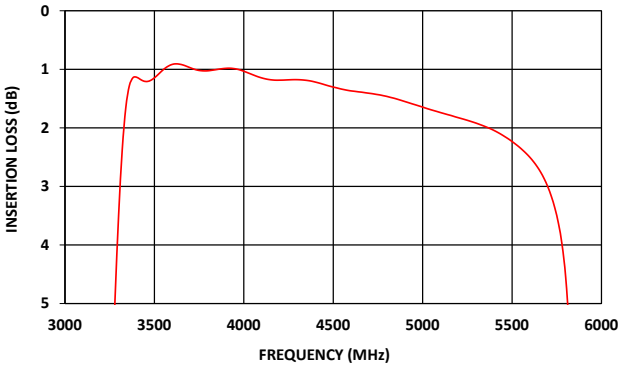
50Ω 3700 to 5300 MHz

TYPICAL PERFORMANCE GRAPHS AT +25°C

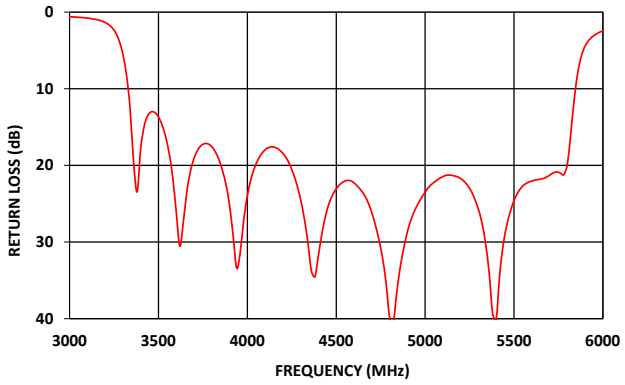
ABF-4R5G+
INSERTION LOSS



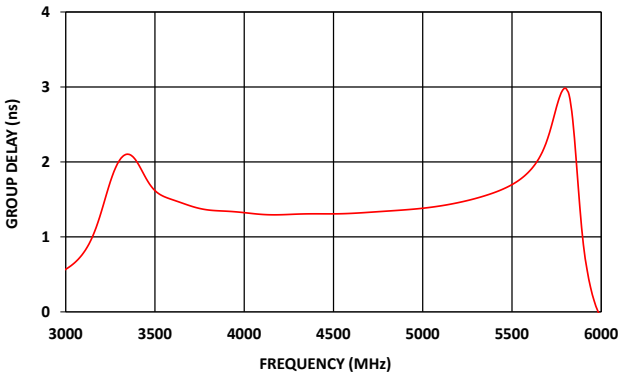
ABF-4R5G+
INSERTION LOSS (Zoomed)



ABF-4R5G+
RETURN LOSS



ABF-4R5G+
GROUP DELAY



THIN FILM SURFACE MOUNT

Band Pass Filter

ABF-4R5G+

50Ω 3700 to 5300 MHz

FUNCTIONAL DIAGRAM

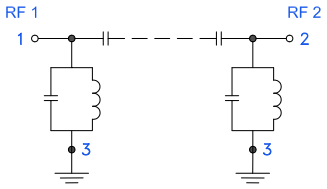
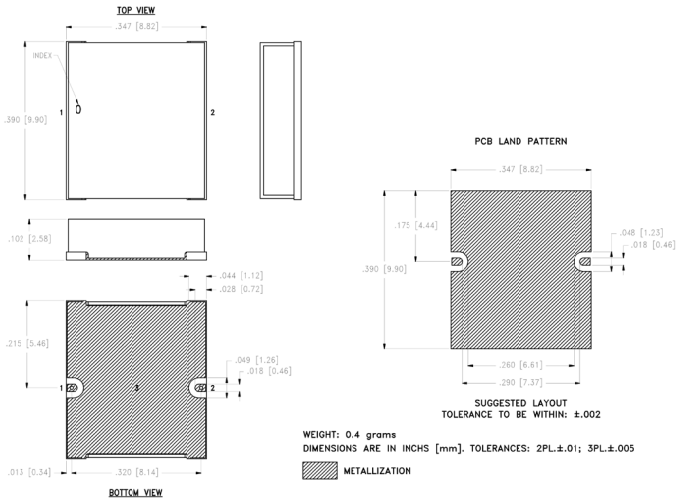


Figure 1. ABF-4R5G+ Functional Diagram

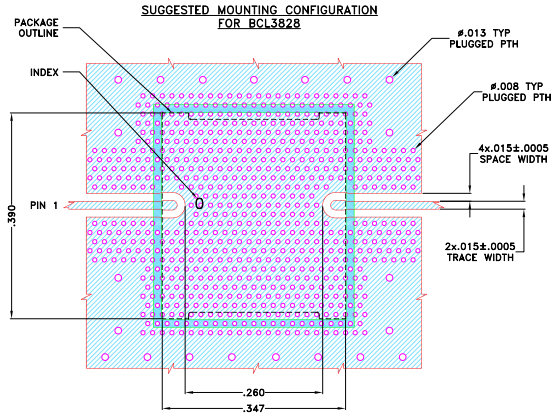
PAD DESCRIPTION

Function	Pad Number	Description
RF1[2]	1	Connects to RF Input Port
RF2[2]	2	Connects to RF Output Port
GROUND	3	Connects to Ground on PCB, (See drawing PL-880)

CASE STYLE DRAWING



SUGGESTED PCB LAYOUT



NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0066±.0007; COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

Figure 2. Suggested PCB Layout

PRODUCT MARKING*: ABF-4R5G

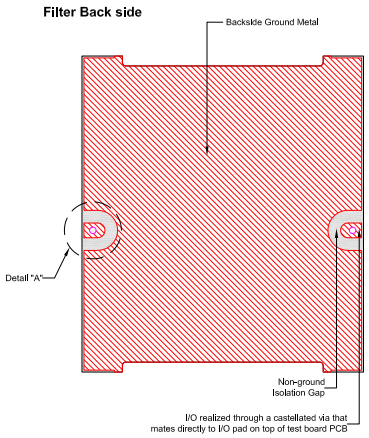
*Marking may contain other features or characters for internal lot control.

Band Pass Filter

ABF-4R5G+

50Ω 3700 to 5300 MHz

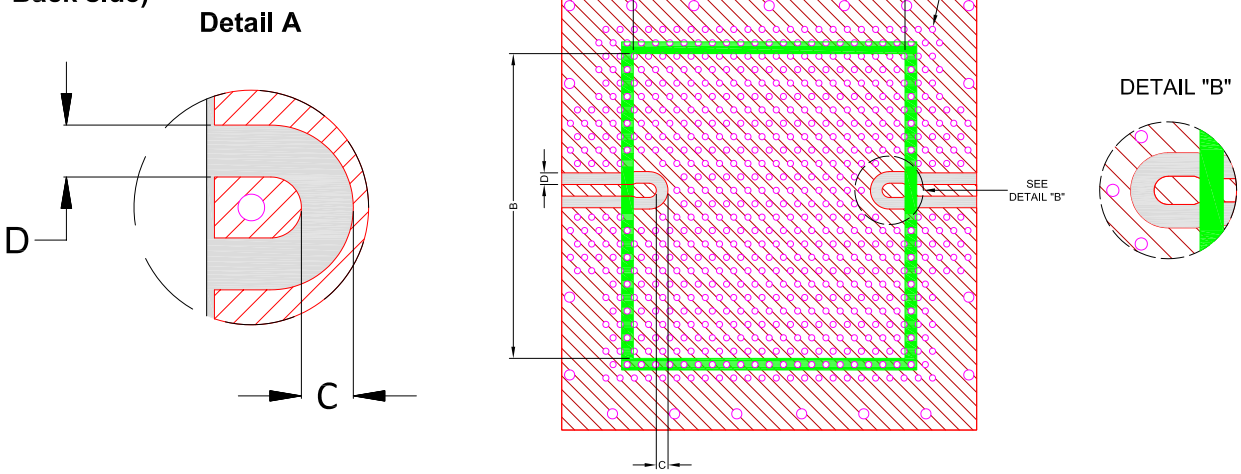
RECOMMENDED PCB LAYOUT PATTERN FOR FILTER



PCB Pattern Recommendations

Filter RF I/O Detail

(Filter Back side)



1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the Customer PCB pattern can be slightly larger to account for component alignment tolerance (ground metal can be pulled back from RF I/O trace).
4) Recommend to use Solder mask at Customer PCB at outer area of filter pattern/ footprint with a clearance of about 1.25mil at each side. (Tighter registration tolerance required for solder mask)
5) Recommended to use Solder mask at I/O of Customer PCB as per above diagram (refer detail B).

Band Pass Filter

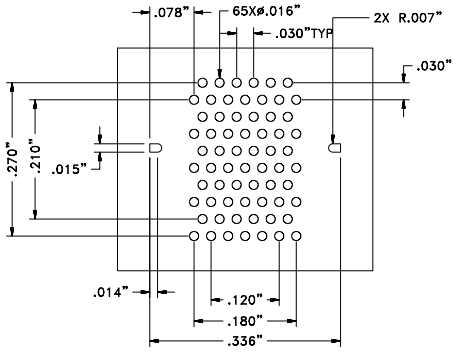
ABF-4R5G+

50Ω 3700 to 5300 MHz

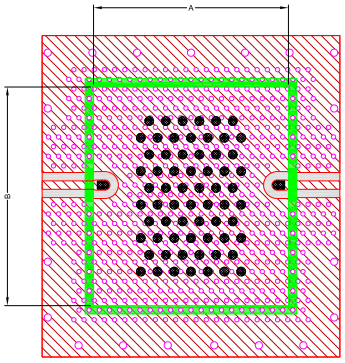
COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

1) Avoid using soldering iron directly to the ceramic filter. This would lead to development of crack in the component due to thermal shock.
2) Vacuum pick-up tool or plastic tweezers are recommended for handling the components. Extra care should be taken not to scratch the filter or metal area.
3) Use 2-3 mil thickness stencil plate and screen print the solder. Refer below picture for recommended stencil pattern to get the best solder attachment.

Stencil opening drawing



Solder location after screen print



4) Plugged ground vias in the PWB will improve attachment consistency.
5) Recommended to have a similar or closer test board material and thickness (refer Mini-Circuits evaluation board for details) to minimize the CTE over the temperature range.

Band Pass Filter

ABF-4R5G+

50Ω 3700 to 5300 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	BCL3828 Lead Finish: Gold over Nickel Plate
RoHS/REACH Status	Compliant
Tape and Reel	F014-1
Suggested Layout for PCB Design	PL-880
Evaluation Board	TB-ABF-4R5G+ Gerber File
Environmental Rating	ENV120T1
MSL Level	MSL1

NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

Thin-Film Bandpass Filter ABF-4R5G+

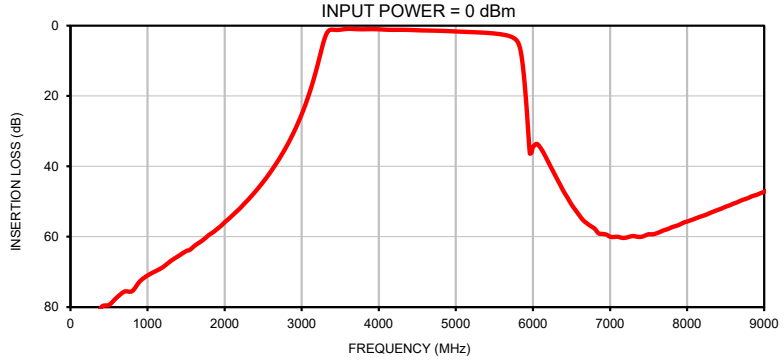
Typical Performance Data

FREQ. (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Output Return Loss (dB)
10	81.30	0.04	0.04
20	94.15	0.04	0.05
30	92.44	0.05	0.06
40	92.86	0.06	0.06
50	103.37	0.07	0.07
60	104.59	0.07	0.08
70	89.93	0.08	0.08
80	96.79	0.08	0.09
90	97.08	0.09	0.09
100	95.00	0.09	0.09
200	86.84	0.14	0.14
300	85.76	0.18	0.19
400	80.07	0.21	0.22
500	79.40	0.23	0.25
600	77.30	0.26	0.27
700	75.60	0.27	0.28
800	75.47	0.27	0.29
900	72.69	0.28	0.29
1000	71.02	0.28	0.30
1100	69.84	0.28	0.30
1200	68.64	0.28	0.30
1300	66.90	0.28	0.29
1400	65.49	0.28	0.29
1500	64.10	0.27	0.28
1600	62.75	0.27	0.28
1700	61.25	0.27	0.27
1800	59.44	0.26	0.27
1900	57.84	0.26	0.26
2000	55.90	0.26	0.27
2500	44.42	0.31	0.32
2900	30.17	0.50	0.52
3080	20.47	0.73	0.76
3300	3.49	5.50	5.62
3400	1.13	17.79	18.40
3700	0.97	19.08	19.49
3800	1.03	17.56	17.92
3900	0.98	25.21	26.15
4000	1.03	23.96	24.64
4200	1.19	18.42	18.85
4400	1.22	31.67	34.51
4600	1.37	22.27	22.52
4800	1.46	39.84	36.78
5000	1.65	23.47	22.53
5300	1.92	25.75	23.41
5700	3.01	21.28	22.72
5920	24.02	3.69	3.78
6200	38.80	1.45	1.37
6250	40.93	1.33	1.26
6500	50.83	0.97	0.96
6600	53.87	0.89	0.90
6700	56.18	0.83	0.85
6800	57.68	0.78	0.82
6900	59.21	0.75	0.80
7000	60.00	0.72	0.78
7200	60.30	0.69	0.76
7400	60.05	0.67	0.75
7600	59.06	0.67	0.75
8000	55.68	0.69	0.76
8500	51.47	0.77	0.80
9000	47.22	0.85	0.82

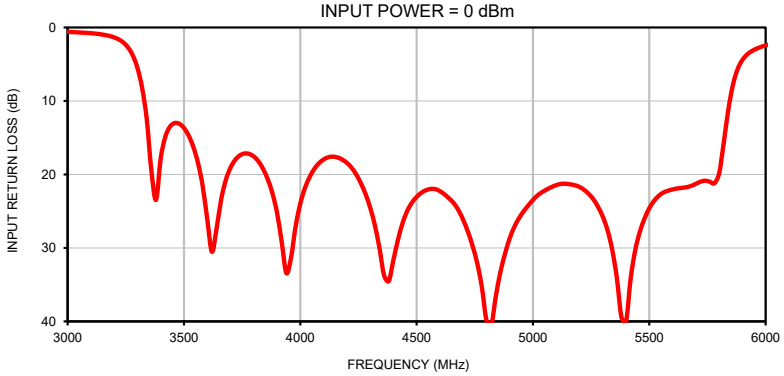
FREQ. (MHz)	Group Delay (ns)
3700	1.41
3720	1.40
3740	1.39
3760	1.37
3780	1.37
3800	1.36
3820	1.35
3840	1.35
3860	1.35
3880	1.35
3900	1.34
3920	1.34
3940	1.34
3960	1.33
3980	1.33
4000	1.32
4020	1.32
4040	1.31
4060	1.31
4080	1.30
4100	1.30
4120	1.30
4140	1.30
4160	1.29
4180	1.29
4200	1.30
4220	1.30
4240	1.30
4260	1.30
4280	1.30
4300	1.30
4320	1.31
4340	1.31
4360	1.31
4380	1.31
4400	1.31
4420	1.31
4440	1.31
4460	1.31
4480	1.31
4500	1.31
4520	1.31
4540	1.31
4560	1.31
4580	1.31
4600	1.31
4620	1.32
4640	1.32
4700	1.33
4720	1.33
4740	1.33
4760	1.34
4780	1.34
4800	1.34
4900	1.36
5000	1.38
5100	1.41
5200	1.46
5240	1.48
5300	1.52

Typical Performance Curves

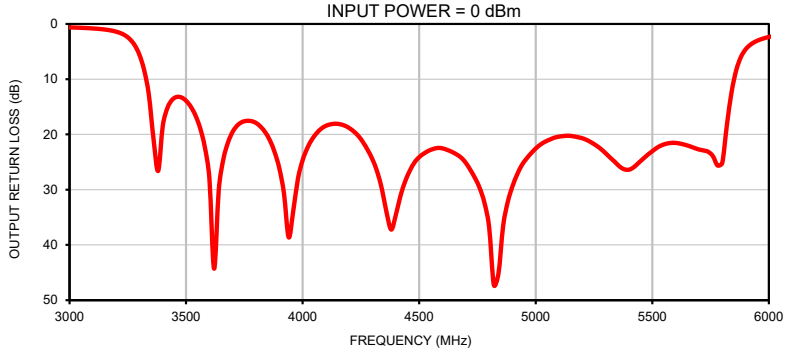
INSERTION LOSS
INPUT POWER = 0 dBm



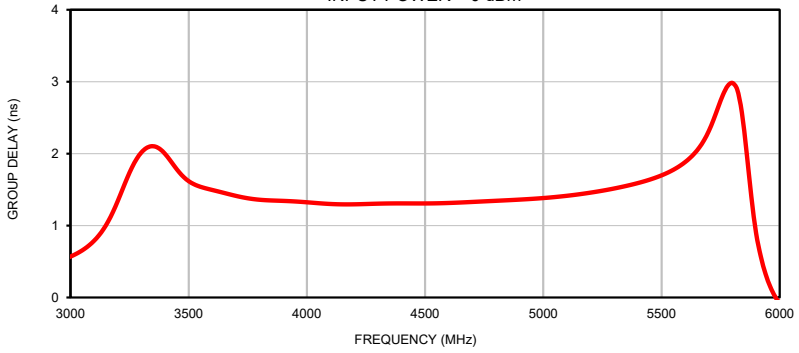
INPUT RETURN LOSS
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS
INPUT POWER = 0 dBm

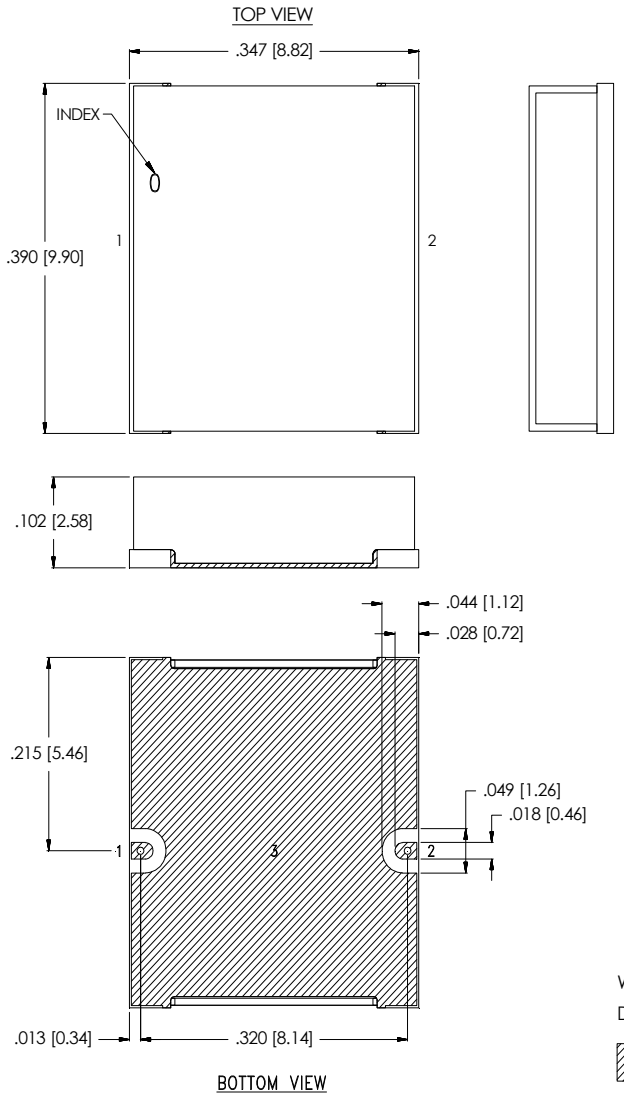


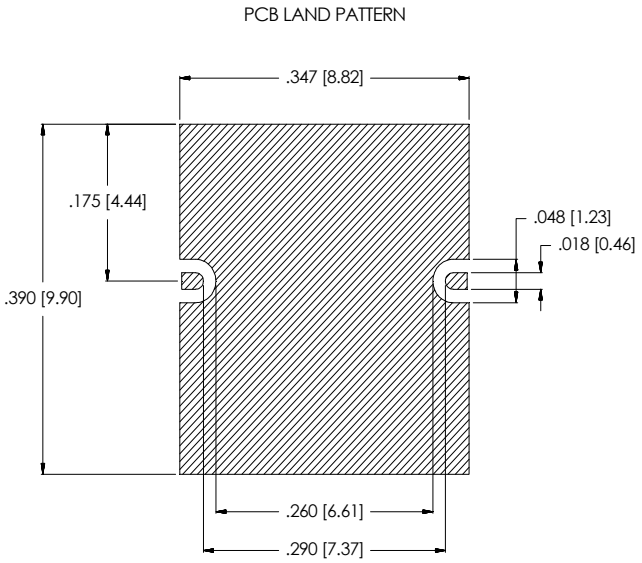
GROUP DELAY
INPUT POWER = 0 dBm



Case Style BCL

Outline Dimensions BCL3828





WEIGHT: 0.4 grams

DIMENSIONS ARE IN INCH [MM]. TOLERANCE: 2PL ± .01; 3PL ± .005

METALLIZATION

Notes:

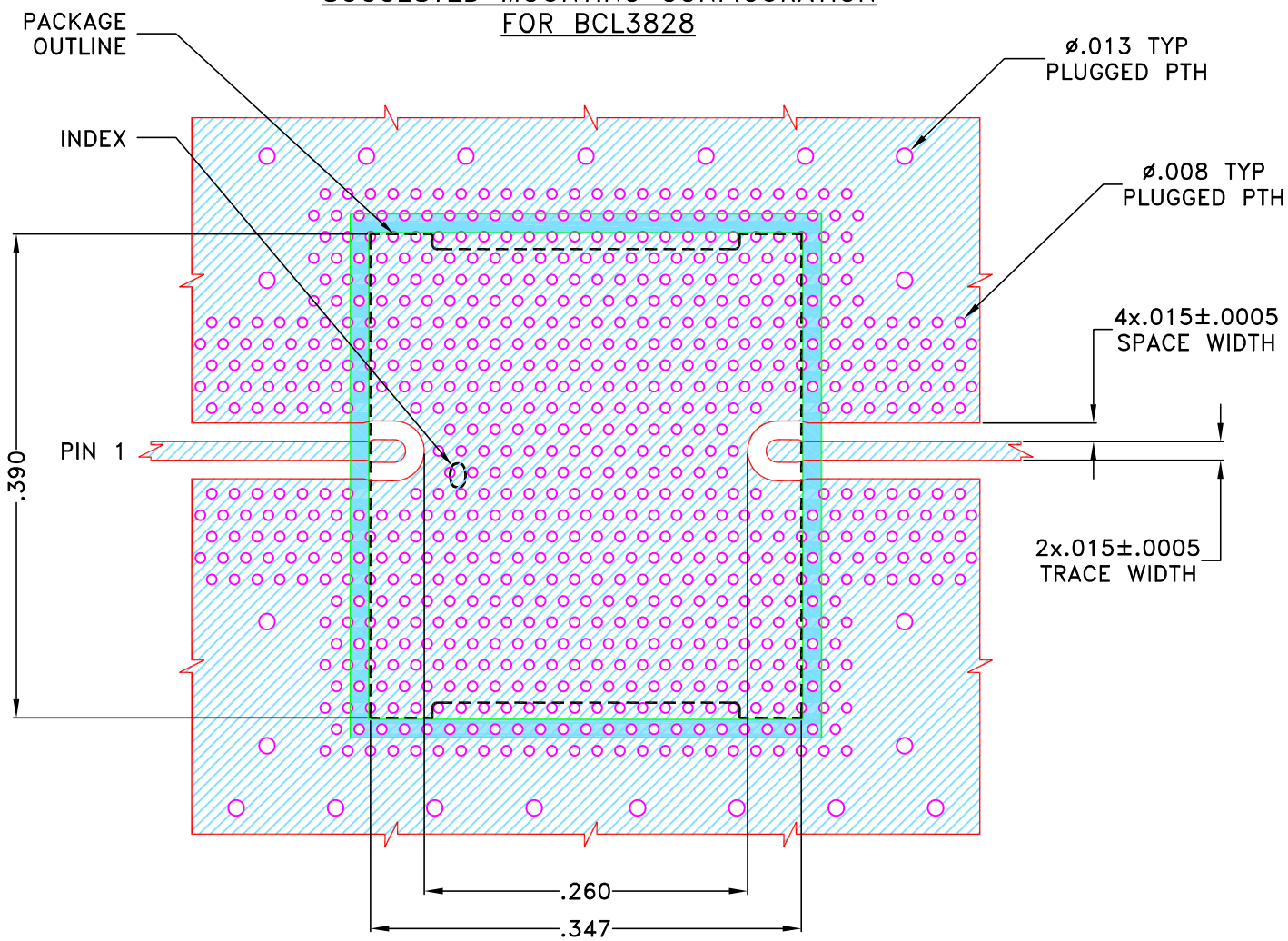
1. Case material: Gold over Nickel over Annealed Stainless Steel.
2. Base: Ceramic
3. Termination finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Gold over Nickel plate. All models, (+) suffix.

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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NPO-006450	NEW RELEASE	AUG 26	RPK	GT

SUGGESTED MOUNTING CONFIGURATION FOR BCL3828



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0066±.0007; COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	RPK	05 AUG 26
TOLERANCES ON:	CHECKED	LK	07 AUG 26
2 PL DECIMALS ±	APPROVED	NRV	07 AUG 26
3 PL DECIMALS ± .002			
ANGLES ±			
FRACTIONS ±			

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ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

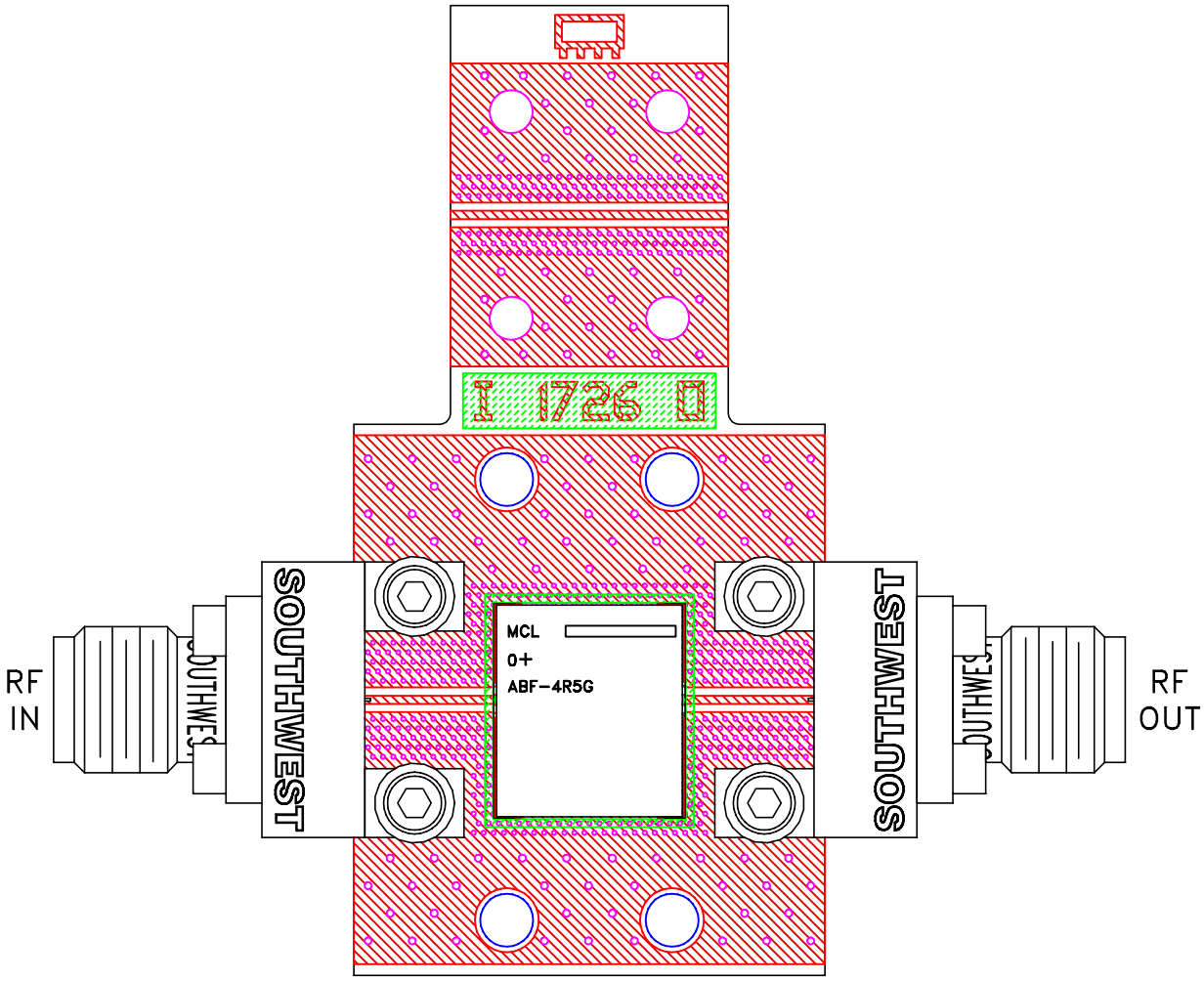
PL DWG, BCL3828, TB-ABF-4R5G+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-880	OR

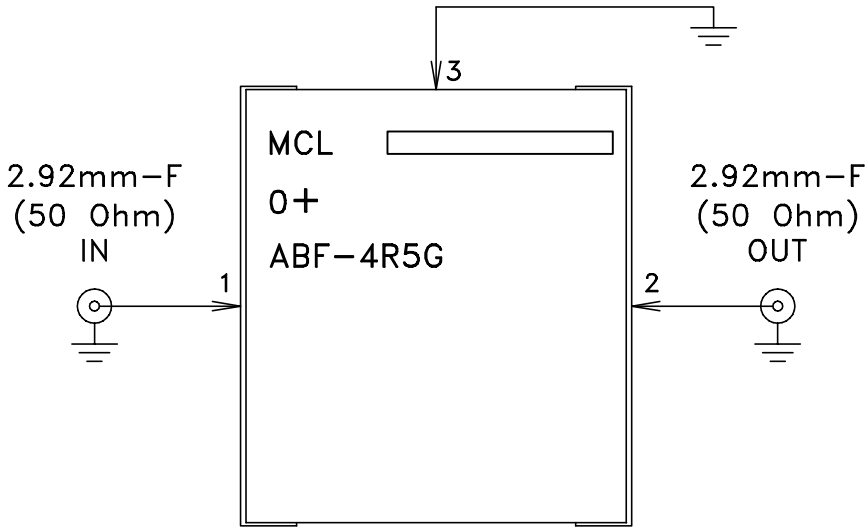
FILE:	SCALE:	SHEET:
98-PL-880	6.7:1	1 OF 1

Evaluation Board and Circuit

TB-ABF-4R5G+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05 Dielectric Thickness: .0066±.0007 inch
2. 50 Ohm 2.92mm Female Connectors.

Mini-Circuits®

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Mini-Circuits

Environmental Specifications ENV120T1

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Thermal Shock	-55° to 125°C, 25 cycles	MIL-STD-202, Method 107, Condition A-1, Except +125°C

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